

REMARKS

This responds to the Office Action mailed on 7 March 2006.

Claims 1, 2, 6-10, 13, 17-20, 24, and 25 and withdrawn claims 26, 27, 31-35, 40, 41, and 45-49 are amended, no claims are canceled, and claims 79-91 are added; as a result, claims 1-51 and 79-91 are now pending in this application with claims 1-25 and 79-91 currently pending examination. The amendments to the claims are fully supported by the specification as originally filed. No new matter is introduced. Applicant respectfully requests reconsideration of the above-identified application in view of the amendments above and the remarks that follow.

Support for the amendments to claim 1, 13, and 20 and withdrawn claims 26 and 40 may be found in the specification, for example, on page 5, line 3-6 and page 6, lines 17-21. Claims 2, 3, and 6-10, claims 17-19, and claims 24 and 25 are amended to follow the language of the amendments to claims 1, 13, and 20, respectively. Withdrawn claims 27 and 31-35 and 41 and 45-49 are amended to follow the language of the amendments to withdrawn claim 26 and 40, respectively. Support for claim 79 may be found in original claims 1 and 3 and in the specification, for example, on page 13, lines 1-5. Support for claims 80-81 may be found in the specification, for example, on page 7, lines 15-24. Support for claims 82-84 may be found in the specification, for example, on page 13, lines 20-22, page 11, lines 5-7, and page 8, lines 5-13. Support for claim 85 may be found in the specification, for example, on page 13, lines 13-15. Support for claim 86 may be found in the specification, for example, on page 18, lines 20-30. Support for claims 87-91 may be found in the specification, for example, on page 20, line 10 – page 21, line 24.

In the Specification

The specification is amended with the paragraphs beginning on page 2, line 4 – line 17, including the heading Summary of the Invention but before the heading Brief Description of the Drawings, being deleted. The specification is amended with paragraphs inserted beginning on page 6, line 22 before the original paragraphs beginning on page 6, line 22. The inserted paragraphs are from the specification as originally filed on page 2, line 6 – 15. No new matter is introduced.

First §102 Rejection of the Claims

Claims 1-8, 10, 11, and 13-25 were rejected under 35 U.S.C. § 102(b) for anticipation by Rose (U.S. 4,543,486). Applicant traverses these grounds of rejection of these claims.

In the Office Action, it is stated that “Rose teaches a method of photolytic CVD in which the laser frequency is chosen so that it excites the reaction gases which then react and deposit on the substrate (column 4, lines 20-25).” Rose at column 4, lines 19-30 recites:

The silicon nitride coatings thus formed can be of almost theoretical density, of high purity, and are also very hard. When a laser is used to assist this process it is often known as LCVD. In the photolytic route, the laser frequency is chosen so that it excites the gases which then react, or else the laser light frequency excites another chemical which then causes the desired reaction. In the pyrolytic or heating route, the laser is used to heat the gases which then react, or alternatively, the laser heats the surface on which the reaction product is to be deposited and the gases react at the heated surface spot.

Applicant submits that this quoted section of Rose does not disclose, teach, or suggest activating a gas precursor to deposit a material on the substrate by irradiating the gas precursor with electromagnetic energy at a frequency tuned to an absorption frequency of the gas precursor as recited in original claim 1. Applicant submits that a “pyrolytic or heating route” as discussed in Rose deals with heating a material using light to dissociate the material. Such heating need not be at the absorption frequency of the material, nor does the source need to be tuned to the absorption frequency of the material. Further, Rose appears to be void of a discussion regarding tuning electromagnetic energy to the absorption frequency of a material and void of a discussion regarding absorbing light energy at an absorption frequency of a material. Applicant submits that the discussion in Rose primarily deals with monitoring by a photoacoustic effect using a laser and annealing a previously formed CVD film and not forming a film by LCVD.

Therefore, Applicant submits that Rose does not disclose, teach, or suggest all the elements in complete detail as in original claim 1. Further, Applicant cannot find in Rose a disclosure, a teaching, or a suggestion of the additional features in amended claim 1. Thus, Applicant submits that claim 1 is patentable over Rose. For at least reasons similar to those discussed above with respect to claim 1, Applicant submits that independent claims 13 and 20 are patentable over Rose.

In the Office Action, it is stated that “[c]olumn 5, lines 20-60, and column 7, lines 3-32, read on the limitations of the dependent claims, including the raster scanning, laser array, and diode lasers.” Applicant disagrees. Applicant submits that Rose in column 5, lines 20-60, and column 7, lines 3-32, discusses annealing a previously formed CVD film and monitoring by a photoacoustic effect using a laser. For instance, column 5, lines 28-31 refers to a workpiece having a CVD coating and column 5, lines 55-57 refers to a favourable reordering of the CVD coating due to the treatment discussed in this section. For instance, column 7, line 17-27 refers to chopping a beam in the audio frequency range and detecting the chopped light source. In addition, Applicant cannot find in Rose a disclosure, a teaching, or a suggestion of a laser array. Further, Applicant cannot find in Rose a disclosure, a teaching, or a suggestion of a diode laser array.

Claims 2-8, 10, and 11, claims 14-19, and claims 21-25 depend on claims 1, 13, and 20, respectively. Applicant submits that claims 2-8, 10, 11, and 14-19, and 21-25 are patentable over Rose for at least the reasons stated herein.

Applicant respectfully requests withdrawal of these rejections of claims 1-8, 10, 11, and 13-25, and reconsideration and allowance of these claims.

Second §102 Rejection of the Claims

Claims 1, 2, 5-11, 13, and 16-19 were rejected under 35 U.S.C. § 102(b) for anticipation by Schachameyer et al. (U.S. 4,940,505). Applicant traverses these grounds of rejection of these claims.

Applicant cannot find in Schachameyer et al. (hereafter Schachameyer) a disclosure, a teaching, or a suggestion of a method including activating a gas to deposit a material on the substrate by irradiating the gas with electromagnetic energy at a frequency tuned to an absorption frequency of the gas and controlling the irradiation such that the gas does not decompose prior to a reaction that forms the material, if the gas is a reactant precursor to form the material. Schachameyer relates to a method of forming crystalline silicon on a silicon substrate using a laser to dissociate material on the silicon substrate and to decompose gases such as molecular hydrogen and silane. See Schachameyer column 3, lines 7-11 and column 3, lines 34-46.

Applicant cannot find in Schachameyer et al. (hereafter Schachameyer) a disclosure, a

teaching, or a suggestion of a method including activating a gas to deposit a material on the substrate by irradiating the gas with electromagnetic energy at a frequency tuned to an absorption frequency of the gas and controlling the irradiation such that, if the gas is not a reactant precursor to form the material, the gas decomposes into one or more reactant molecular gas precursors that enter into a reaction with another substance that forms the material. Schachameyer relates to a method of forming crystalline silicon on a silicon substrate using a laser to dissociate material on the silicon substrate and to decompose gases such as molecular hydrogen and silane. In Schachameyer, the silane decomposes to deposit silicon on the silicon substrate. See Schachameyer column 3, lines 7-11 and column 3, lines 34-46. Applicant submits that silane decomposing after laser pyrolytics does not teach or suggestion one or gas reactant molecular gas precursors in a reaction with another substance that forms a material as recited in claim 1. Applicant submits that Schachameyer does not teach the identical invention in as complete detail as is contained in claim 1 and that claim 1 is patentable over Schachameyer.

For at least reasons similar to those discussed above with respect to claim 1, Applicant submits that independent claims 13 is patentable over Schachameyer. Claims 2, 5-11 and claims 16-19 depend on claims 1 and 13, respectively. Applicant submits that claims 2, 5- 11, and claims 16-19 are patentable over Schachameyer for at least the reasons stated herein.

Applicant respectfully requests withdrawal of these rejections of claims 1, 2, 5-11, 13, and 16-19, and reconsideration and allowance of these claims.

First §103 Rejection of the Claims

Claim 12 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Rose (U.S. 4,543,486) in view of alleged Applicant's admitted prior art. Applicant traverses these grounds of rejection of these claims.

In the Office Action, it is stated that "Rose . . . is silent to the method being used in an ALD process" and that "the applicant admits on page 8, lines 7-13, that ALD is a widely known process that is a type of CVD process . . . an ALD process would have been obvious." Applicant respectfully disagrees. The instant specification, on page 8, lines 7-13, recites:

ALD, also known as atomic layer epitaxy (ALE), was developed in the early 1970's as a modification of chemical vapor deposition (CVD) and is also called "alternatively pulsed-CVD." In ALD, gaseous precursors are introduced

one at a time to the substrate surface mounted within a reaction chamber (or reactor). This introduction of the gaseous precursors takes the form of pulses of each gaseous precursor. Between the pulses, the reaction chamber is purged with a gas, which in many cases is an inert gas, and/or evacuated.

Applicant submits that though ALD was developed as a modification of CVD, ALD is a different process than CVD and that enhancements to CVD methods are not *per se* applicable to ALD. Applicant cannot find in Rose or in the Office Action a teaching or suggestion that there is a reasonable expectation of success for using a “photolytic laser of the CVD process taught by Rose in an ALD process,” as proffered in the Office Action. The application of Rose to claim 12 is conclusory and not based on objective evidence of record. Thus, Applicant submits that the rejection of claim 12, as proffered in the Office Action, is not proper.

Further, claim 12 depends on claim 1. As noted above, claim 1 is patentable over Rose. Applicant submits that claim 12 is patentable over Rose for at least the reasons stated herein.

Applicant respectfully requests withdrawal of these rejections of claim 12, and reconsideration and allowance of this claim.

Second §103 Rejection of the Claims

Claim 12 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Schachameyer et al. (U.S. 4,940,505) in view of alleged Applicant’s admitted prior art. Applicant traverses these grounds of rejection of these claims.

In the Office Action, it is stated that “Schachameyer . . . is silent to the method being used in an ALD process” and that “the applicant admits on page 8, lines 7-13, that ALD is a widely known process that is a type of CVD process . . . an ALD process would have been obvious.” Applicant respectfully disagrees. The instant specification, on page 8, lines 7-13, recites:

ALD, also known as atomic layer epitaxy (ALE), was developed in the early 1970's as a modification of chemical vapor deposition (CVD) and is also called “alternatively pulsed-CVD.” In ALD, gaseous precursors are introduced one at a time to the substrate surface mounted within a reaction chamber (or reactor). This introduction of the gaseous precursors takes the form of pulses of each gaseous precursor. Between the pulses, the reaction chamber is purged with a gas, which in many cases is an inert gas, and/or evacuated.

Applicant submits that though ALD was developed as a modification of CVD, ALD is a different process than CVD and that enhancements to CVD methods are not *per se* applicable to ALD. Applicant cannot find in Schachameyer or in the Office Action a teaching or suggestion that there is a reasonable expectation of success for using a “photolytic laser of the CVD process taught by Rose in an ALD process,” as proffered in the Office Action, or that there is a reasonable expectation of success for using a photolytic laser of the CVD process taught by Schachameyer in an ALD process. The application of Schachameyer to claim 12 is conclusory and not based on objective evidence of record. Thus, Applicant submits that the rejection of claim 12, as proffered in the Office Action, is not proper.

Further, claim 12 depends on claim 1. As noted above, claim 1 is patentable over Schachameyer. Applicant submits that claim 12 is patentable over Schachameyer for at least the reasons stated herein.

Applicant respectfully requests withdrawal of these rejections of claim 12, and reconsideration and allowance of this claim.

New Claims

Applicant cannot find in Rose or in Schachameyer a disclosure, a teaching, or a suggestion of a diode laser array. Further, Applicant cannot find in Rose or in Schachameyer a disclosure, a teaching, or a suggestion of a diode laser array used as recited in original claim 4. New claim 79 cites the features of original claim 1 with additional features including using a diode laser array. Claims 80-91 depend on claim 79. Applicant respectfully requests consideration and allowance of claims 79-91.

Withdrawn Claims

Withdrawn independent claims 26 and 40 are amended in line with the amendments to claims 1. Applicant submits that the withdrawn claims include features additional to features of claim 1 and are linked to claim 1. With the allowance of claim 1, Applicant respectfully requests the rejoinder and allowance of claims 26-51. *See M.P.E.P. 809 and 821.04.*

CONCLUSION

Applicant respectfully submits that the claims are in condition for allowance, and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney at (612) 371-2157 to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,

ROSS S. DANDO ET AL.

By their Representatives,

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Date 7 June 2006

By



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CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being filed using the USPTO's electronic filing system EFS-Web, and is addressed to: Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 7 day of April, 2006.

KATE GANNON

Name



Signature